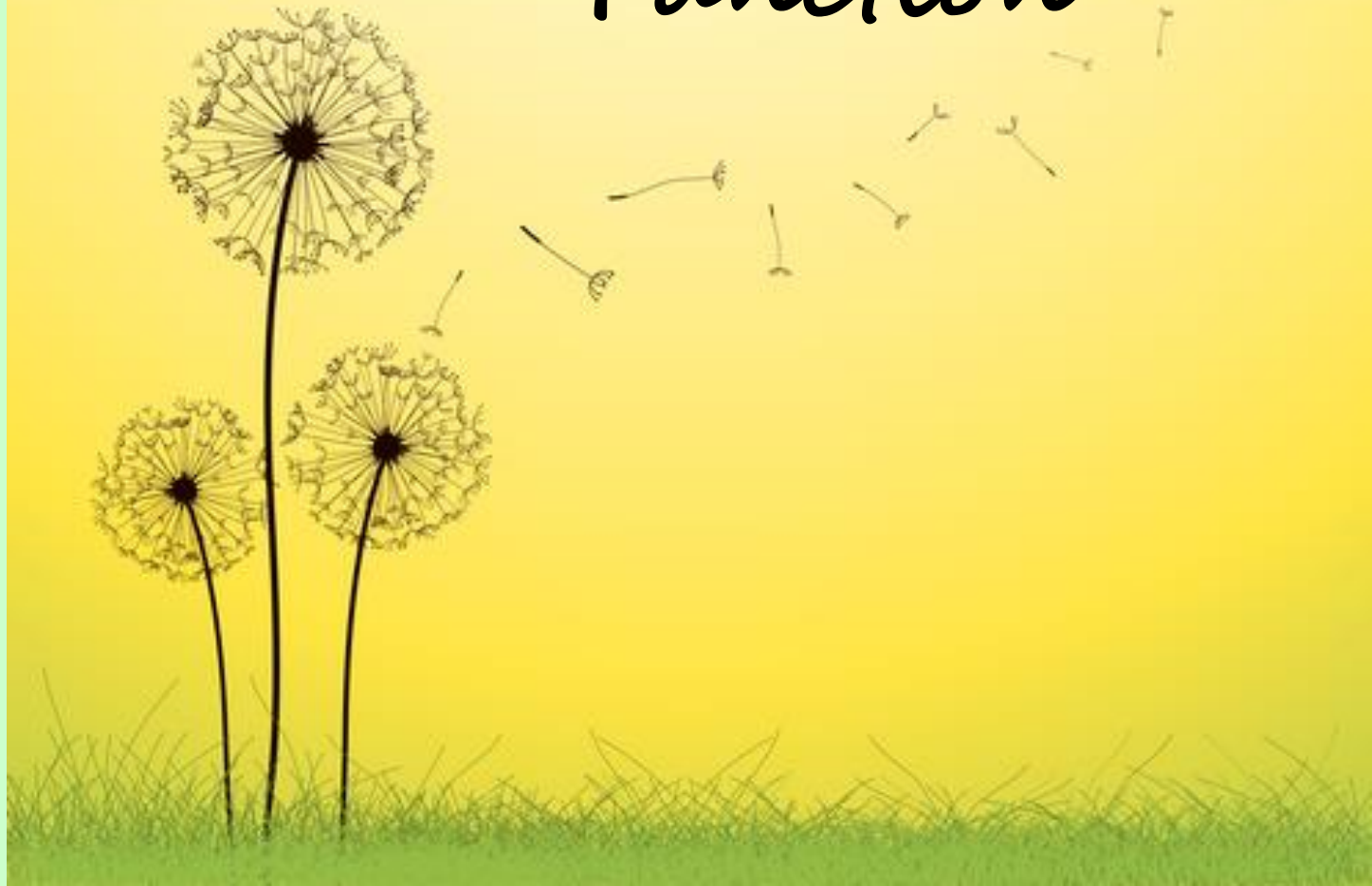


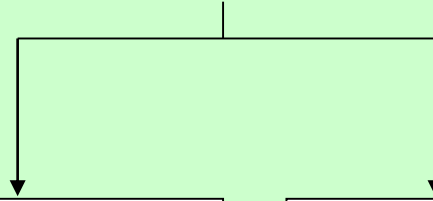
Unit 5

Plants: Anatomy and Function





PLANT KINGDOM



1. Non-Vascular Plants

Bryophytes – moss, liverworts, hornworts

- **Lack vascular tissue**, roots, stems and leaves
- Fertilization requires water.
- Fertilization and sporophyte (2n) germination occur within the gametophyte (n)
- Small sporophyte releases haploid spores

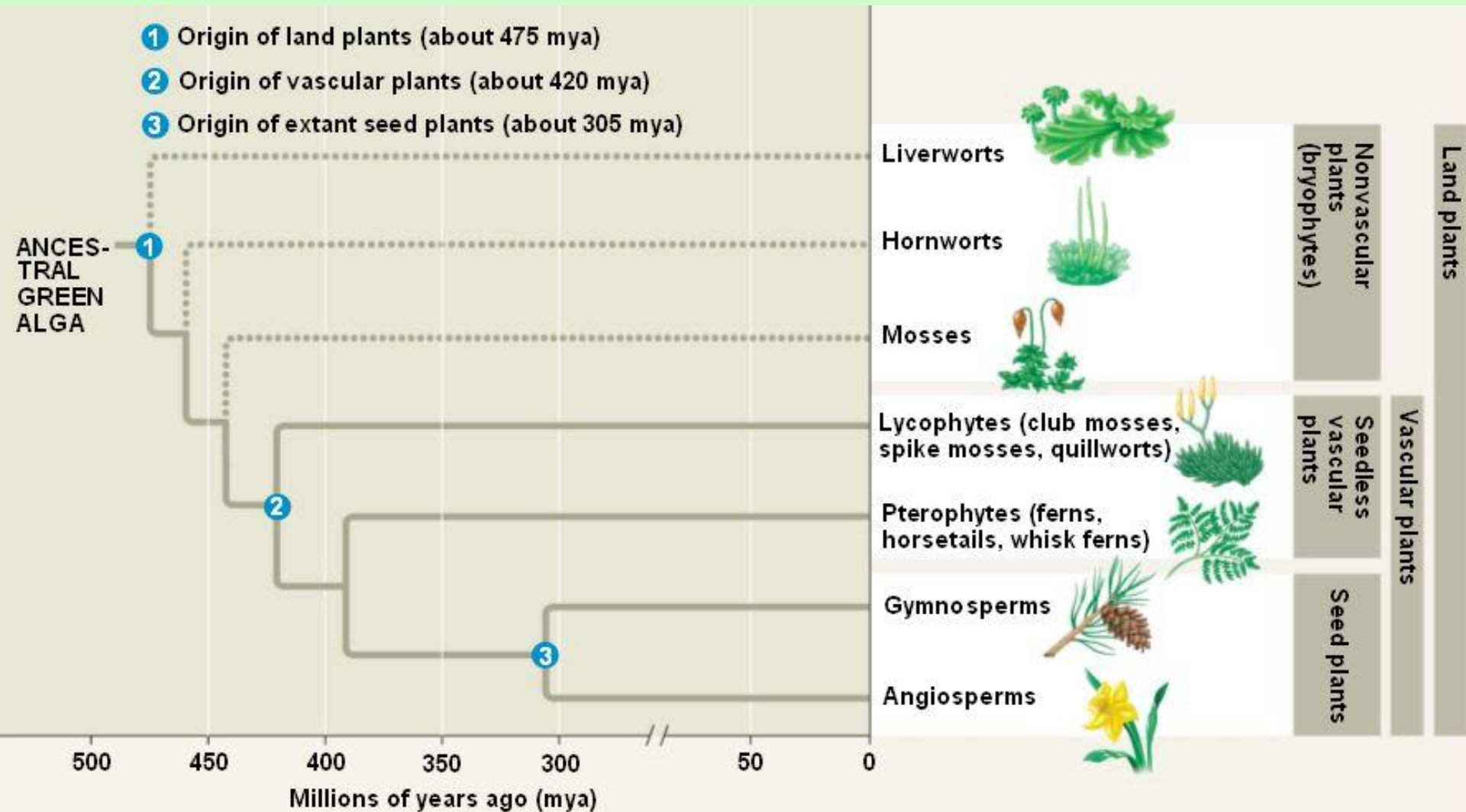
Vascular Plants

- Have **vascular tissue** (xylem and phloem to transport water and nutrients in plant)
- Less dependence on ground-level growth
- **Lignin** makes cell walls more rigid (responsible for great strength of woody tissue)

Importance of Vascular Tissue

- In order for roots, stems & leaves to grow, they need a steady supply of water, energy & nutrients.
- Many plants have specialized **VASCULAR TISSUES** made of cells that are able to conduct solutions throughout the plant.
- In many ways, a plant's vascular system is like the CIRCULATORY SYSTEM in animals; CARRYING WATER, DISSOLVED MINERALS & SUGARS to all parts of the plant.
- The evolution of vascular tissue has allowed plants to become much larger than the first plants that colonized the land.

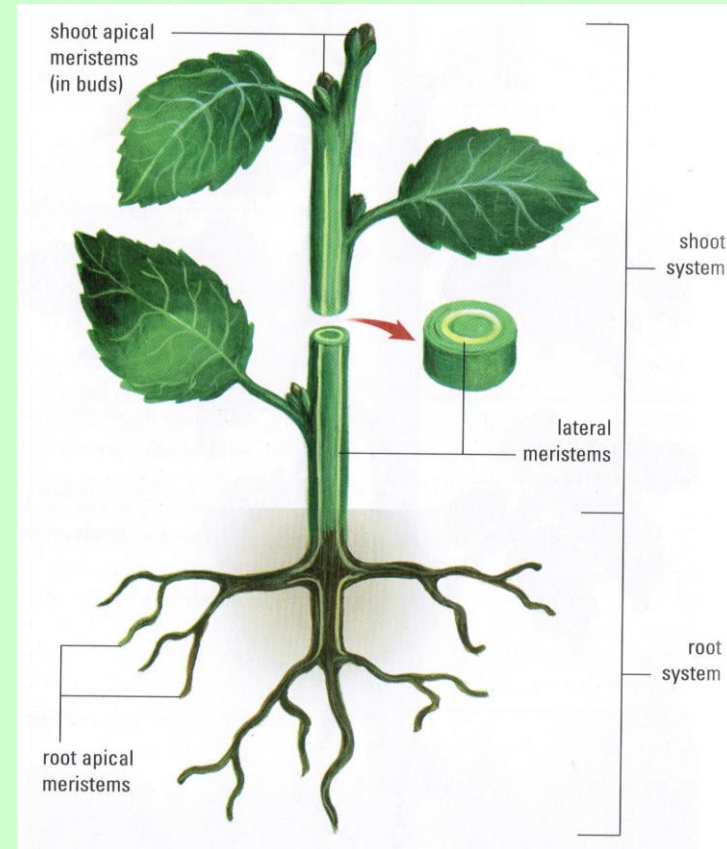
Recall the phylogeny and grouping of vascular plants:



- Cells of all complex plants are organized into tissues, tissue systems, organs, and organ systems that enable the plants to carry out the basic processes of life such as photosynthesis, distribution and storage of carbohydrates, growth, and reproduction.

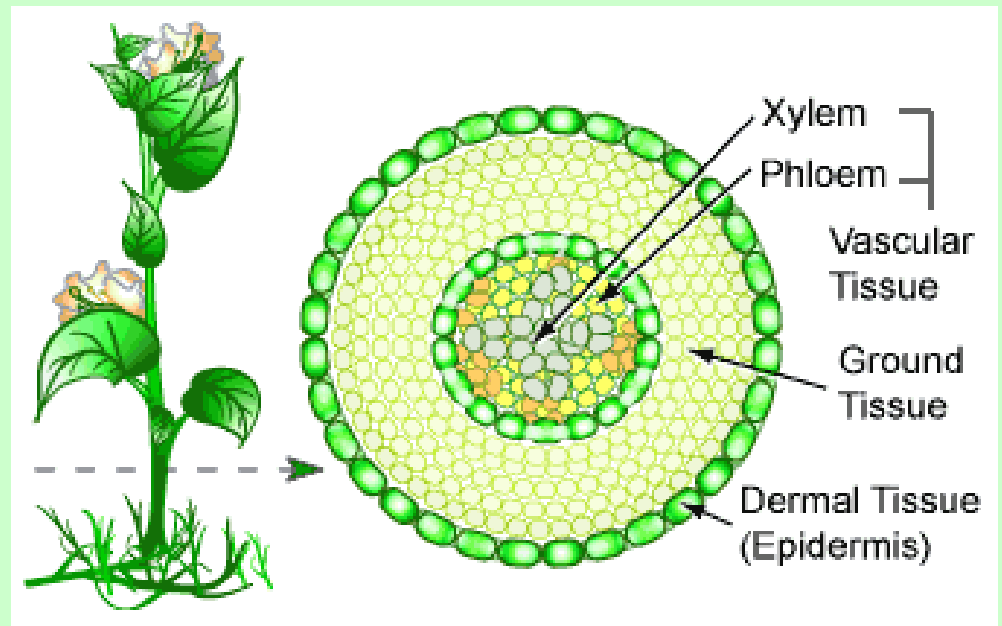
Meristem

- Plants cells divide by mitosis only in specific regions called **meristems**.
- The meristems at the root tips and shoots are called **apical meristems**.
- Lateral meristems** are cylindrical regions in roots and stems. They are responsible for all increasing in diameters of roots and stems.
- Cell division within the **vascular cambium** (lateral meristem) produces cells which become new xylem and phloem tissue.



Vascular Plants have three types of tissues:

- 1) **Dermal** = outer protective layers
- 2) **Vascular** = transports water/nutrients, supports plant
- 3) **Ground** = supports life processes (growth, storage, protection)



Recall that vascular seed plants include monocots and eudicots (dicots). What are the differences?

Differences between monocots and eudicots:

Seed leaf (cotyledon)	Veins in leaves	Flower parts	vascular bundle in stem
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Monocot



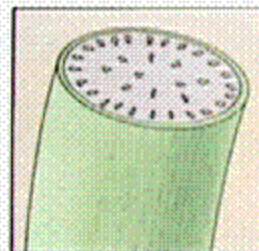
One cotyledon



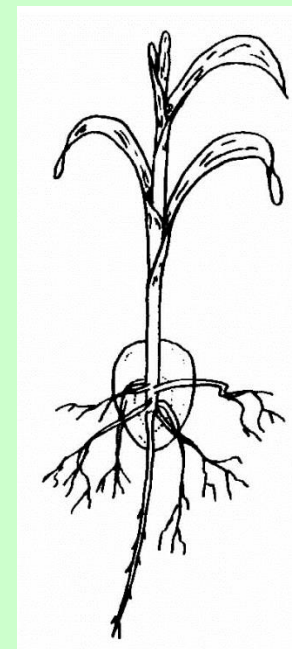
Usually Parallel



Usually in multiples of three

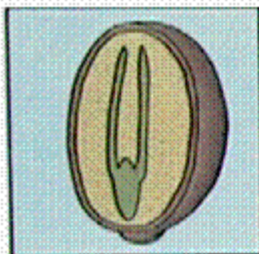


Scattered

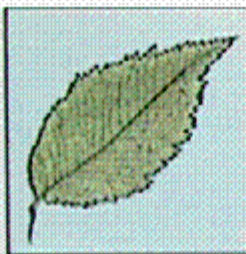


Eudicot

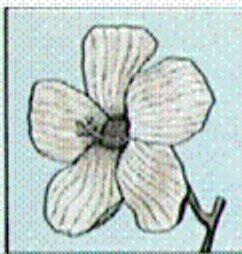
Two cotyledons



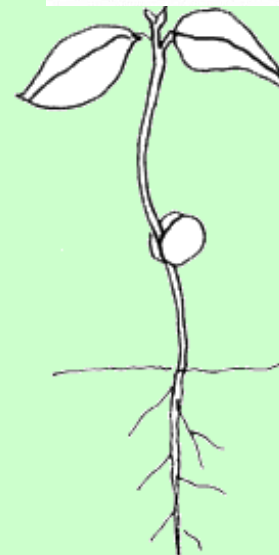
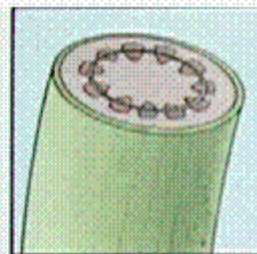
Usually netlike



in fours or fives

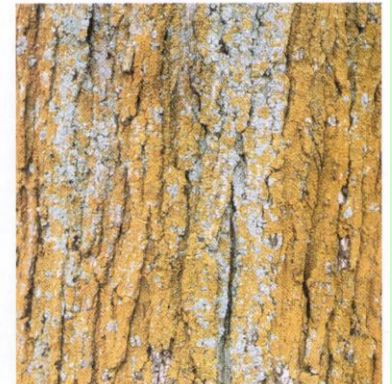


In a ring



1) Dermal Tissue System

- Dermal tissue cells are found in the epidermis and the periderm
- The outermost cell layer of the main plant body is the epidermis.
- The epidermis produces on its exterior surface a waxy, non-cellular layer called the cuticle – protect against water loss, infection, and restricts gaseous exchange.
- During secondary growth epidermis is replaced by the periderm which is the outer protective covering.



2) Ground Tissue System

- Three types of ground tissue

1) Parenchyma

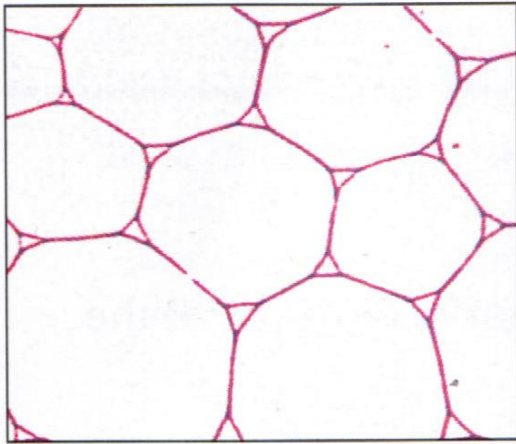
- a living ground tissue that makes up the bulk of the plant body.
- Involved in photosynthesis and the storage of nutrients, carbohydrates, and water
- It also functions in healing wounds and regenerating parts

2) Collenchyma

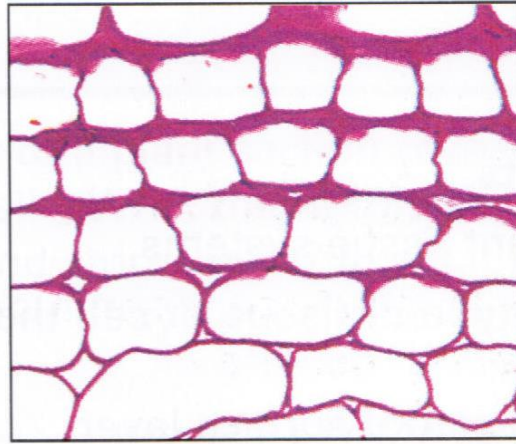
- A living ground tissue that offers flexible support for primary growth.
- Able to bend to withstand windy conditions.

3) Sclerenchyma

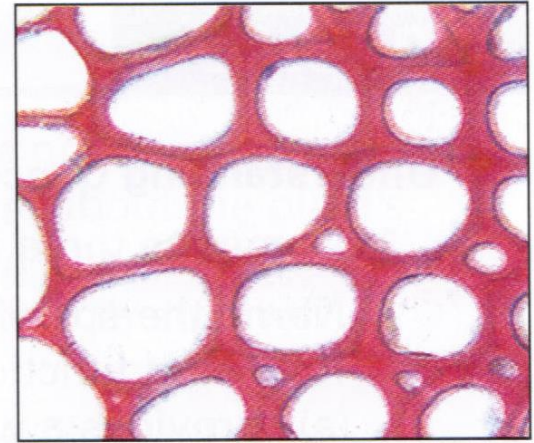
- Ground tissue whose mature cells are dead
- Have thick walls composed of cellulose and lignin
- Support plants and often protect seeds



(a)



(b)



(c)

Figure 2

Photomicrographs showing cross-sectional views of (a) parenchyma with large spaces for water storage; (b) collenchyma with moderately thick cell walls for flexibility; and (c) sclerenchyma with very thick cell walls with lignin for strength and support

3) Vascular Tissue System

- Two tissue types

1) Xylem – thick-walled cells, dead at maturity

- Main tissue for conducting water and minerals
- They continue to transport water and dissolved substances until they get filled with various deposits.
- Wood, no matter what kind, is comprised almost entirely of xylem tissue.
- Unidirectional (up only)

2) Phloem – thin-walled cells, living at maturity

- Transports sugar and other solutes throughout the plant body
- bidirectional (up and down)